

CLAIMS

1. An undulated-wall honeycomb structure having a plurality of cell passages, which are mutually parallel in channel direction;

wherein intersection portions between walls partitioning said cell passages are formed so as to maintain a predetermined pitch at cross-sections perpendicular to said cell passages and positioned systematically, and wherein the wall face portions of said walls excluding said intersection portions are formed so as to have an undulated shape in both the cell passage direction and the cross-sectional direction perpendicular to said cell passage direction.

2. An undulated-wall honeycomb structure according to Claim 1, wherein, regarding each of said cell passages, the wall face portions of an opposing pair of said walls are each formed so as to have an undulated shape, such that recessions and protrusions on one wall face portion and recessions and protrusions on the other wall face portion are positioned with the protrusions of each facing one another and the recessions of each facing one another, or with the protrusions and the recessions facing one another.

3. An undulated-wall honeycomb structure according to either Claim 1 or 2, wherein said wall face portions formed with an undulated shape and wall face portions formed with a flat shape are formed in an intermingled fashion.

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4. An undulated-wall honeycomb structure according to any of the Claims 1 through 3, wherein, regarding each of said cell passages, at least one of said plurality of walls making up said cell passage is formed with an undulated shape.

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5. An undulated-wall honeycomb structure according to any of the Claims 1 through 4, wherein the undulated deformation whereby said walls are formed with an undulated shape is greater at the outer portion than at the center portion.

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6. An undulated-wall honeycomb structure according to any of the Claims 1 through 5, wherein the amplitude of the undulated deformation of walls are formed with an undulated shape is 150% of the thickness of said walls or more.

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7. An undulated-wall honeycomb structure according to any of the Claims 1 through 6, wherein a line connecting the highest portions of the protrusions and/or the lowest

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portions of the recessions of the wall face portions formed with an undulated shape in said cell passage direction repeats a pattern of turning in the vertical direction to said cell passage direction on said wall face.

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10 8. An undulated-wall honeycomb structure according to any of the Claims 1 through 7, wherein cell passages formed by said wall face portions of said walls formed in an undulated shape and cell passages formed by said wall face portions of said walls formed in a flat shape appear and coexist in a discontinuous manner.

15 9. An undulated-wall honeycomb structure according to any of the Claims 1 through 8, comprising a cell passage area A formed with a generally circular cross-section from the center, and a cell passage area B formed with a generally ring-shaped form at the outer side of said cell passage area A:

20 wherein said cell passage area A contains cell passages formed by said wall face portions of said walls formed having an undulated shape;

and wherein said cell passage area B comprises cell passages formed by said wall face portions of said walls formed having a flat shape;

25 and wherein the thickness of the walls of the cell

passages within said cell passage area B is greater than the thickness of the walls of the cell passages within said cell passage area A, and also wherein the thickness thereof increases in stages from the inner circumference portion toward the outer portion portion or only increases in stages near the boundary between area B and area A.

10. An undulated-wall honeycomb structure according to any of the Claims 1 through 9, wherein the material thereof is one or a composition of a plurality of the following group of ceramic materials: cordierite, alumina, mullite, lithium aluminum silicate, aluminum titanate, titania, zirconia, silicone nitride, aluminum nitride, and silicon carbide; or one of the following group: stainless steel, aluminum alloy; or an adsorbent of either activated charcoal or silica gel or zeolite.

11. An undulated-wall honeycomb structure according to Claim 10, wherein the porosity of the material used is between 45% to 80%.

12. A fine particle removing filter using the undulated-wall honeycomb structure according to Claim 11, comprising filtering layers of walls partitioning the cell passages, by plugging one end of particular cell passages of

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said undulated-wall honeycomb structure and also plugging the other end of the remaining cell passages.

13. A fine particle removing filter according to Claim 5 12 wherein the surface roughness of the undulated walls of said undulated-wall honeycomb structure is 10% or more in Valley Level.

14. A fine particle removing filter according to Claim 10 12 wherein the wall thickness of said undulated-wall honeycomb structure is around 0.2 to 1.2 mm.

15. A fine particle removing filter according to Claim 12 wherein the cell density of said undulated-wall honeycomb structure is around 50 to 600 cpsi (cells per square centimeter).

16. An undulated-wall honeycomb structure according to any one of the Claims 1 through 13, which is used as an 20 exhaust gas purification catalyst carrier for vehicles, and carries catalyst on the surface on the cell wall face and/or in micropores within the walls of said honeycomb structure.

17. An undulated-wall honeycomb structure according to 25 Claim 16 wherein the wall thickness is around 0.01 to 0.12

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mm.

18. An undulated-wall honeycomb structure according to  
Claim 16 wherein the cell density is around 200 to 3000 cpsi  
5 (cells per square inch).

19. An exhaust gas purification catalytic converter,  
using the undulated-wall honeycomb structure according to  
Claim 16.  
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20. An exhaust gas purification catalytic converter  
according to Claim 19, wherein the catalyst component is at  
least one of or a compound of a plurality of the following  
group: a three way catalyst, an oxide catalyst, an NOx  
15 reducing catalyst, a sulfide catalyst, a volatile organic  
gas VOC (Gaseous Organic Compounds), and a dioxins  
decomposing-removing catalyst.

21. An exhaust gas purification catalytic converter  
20 system comprising a plurality of the exhaust gas  
purification catalytic converter according to Claim 19 and a  
plurality of catalytic converters wherein catalyst is  
carried on a normal flat-wall honeycomb structure, said  
catalytic converters being serially alternately arrayed.

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22. An exhaust gas purification catalytic converter system, wherein the exhaust gas purification catalytic converter according to Claim 19 is placed to the upstream side of the exhaust, and the fine particle removing filter according to Claim 12 or a fine particle removing filter comprising a normal flat-wall honeycomb structure is placed to the downstream side of the exhaust.

23. An exhaust gas purification catalytic converter system according to Claim 22, wherein each of said fine particle removing filters is a readily-exchangeable cartridge type.

24. An exhaust gas purification system using the undulated-wall honeycomb structure according to Claim 16, for capturing fine particle substances in the exhaust gas, said exhaust gas purification system comprising:

means for charging said undulated-wall honeycomb structure and electrically capturing said fine particle substances.

25. An exhaust gas purification system using the undulated-wall honeycomb structure according to Claim 16, for capturing fine particle substances in the exhaust gas, said exhaust gas purification system using non-thermal

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equilibrium plasma (non-thermal plasma) or microwave discharge plasma.

26. A fuel tank evaporation system using the  
5 undulated-wall honeycomb structure according to Claim 16,  
for suppressing external leakage of volatile components of  
fuel.

27. An exhaust gas purification system according to  
10 either Claim 24 or 25, wherein said undulated-wall honeycomb  
structure is a readily exchangeable cartridge type  
configuration.

28. A fuel cell system component using the undulated-  
15 wall honeycomb structure according to Claim 16.

29. A sandwich panel using the undulated-wall  
honeycomb structure according to Claim 16.

20 30. A method for manufacturing an undulated-wall  
honeycomb structure, wherein a back plate having adjacent  
through holes with differing material flow resistance is  
used as a nozzle material for extrusion forming.

25 31. A method for manufacturing an undulated-wall

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honeycomb structure according to Claim 30, wherein said back plate changes in thickness from the outer portion toward the center portion.

5           32. A method for manufacturing an undulated-wall honeycomb structure according to either Claim 30 or 31, wherein said back plate has through holes A and through holes B with differing hole diameters.

10           33. A method for manufacturing an undulated-wall honeycomb structure, wherein undulations are formed in metal foil by plasticity working beforehand, and said metal foil is wrapped in a corrugated manner, thereby forming a metal honeycomb structure.

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